Paper No. 19

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte WOLFGANG M. STROBEL

Appeal No. 2002-0049
Application No. 09/317,538

ON BRIEF

Before COHEN, McQUADE, and NASE, Administrative Patent Judges.

NASE, Administrative Patent Judge.

DECISION ON APPEAL

This is an appeal from the refusal of the examiner to allow claims 1 to 7, as amended (Paper No. 12, filed January 17, 2001) subsequent to the final rejection (Paper No. 8, mailed November 15, 2000). These claims constitute all of the claims pending in this application.[1]

We AFFIRM-IN-PART.

[1] The rejection of claims 1 to 7 under 35 U.S.C. § 112, second paragraph, set forth in the final rejection was withdrawn by the examiner (see the Advisory Action (Paper No. 13, mailed January 24, 2001) and page 2 of the answer).

BACKGROUND

The appellant's invention relates to a method of fabricating tools used in processes for die cutting sheet-type work material such that the die cut work material can be advanced thereon without becoming caught (specification, p. 1). A copy of the claims under appeal is set forth in the appendix to the appellant's brief.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Abe et al. (Abe)	4,921,154	May 1, 1990
Dombrowski et al. (Dombrowski)	4,993,896	Feb. 19, 1991

Claims 1 to 7 stand rejected under 35 U.S.C. § 103 as being unpatentable over Abe in view of Dombrowski.

Rather than reiterate the conflicting viewpoints advanced by the examiner and the appellant regarding the above-noted rejection, we make reference to the answer (Paper No. 15, mailed April 24, 2001) for the examiner's complete reasoning in support of the rejection, and to the brief (Paper No. 14, filed March 12, 2001) and reply brief (Paper No. 17, filed June 18, 2001) for the appellant's arguments thereagainst.

OPINION

In reaching our decision in this appeal, we have given careful consideration to the appellant's specification and claims, to the applied prior art references, and to the respective positions articulated by the appellant and the examiner. As a consequence of our review, we make the determinations which follow.

In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a case of obviousness. See In re Rijckaert, 9 F.3d 1531, 1532, 28 USPQ2d 1955, 1956 (Fed. Cir. 1993). A case of obviousness is established by presenting evidence that the reference teachings would appear to be sufficient for one of ordinary skill in the relevant art having the references before him to make the proposed combination or other modification. See In re Lintner, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972). Furthermore, the conclusion that the claimed subject matter is obvious must be supported by evidence, as shown by some objective teaching in the prior art or by knowledge generally available to one of ordinary skill in the art that would have led that individual to combine the relevant teachings of the references to arrive at the claimed invention. See In re Fine, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). Rejections based on 35 U.S.C. § 103 must rest on a factual basis with these facts being interpreted without hindsight reconstruction of the invention from the prior art. The examiner may not, because of doubt that the invention is patentable, resort to speculation, unfounded assumption or hindsight

reconstruction to supply deficiencies in the factual basis for the rejection. See In re Warner, 379 F.2d 1011, 1017, 154 USPQ 173, 178 (CCPA 1967), cert. denied, 389 U.S. 1057 (1968).

With this as background, we analyze the prior art applied by the examiner in the rejection of the claims on appeal.

Abe's invention relates to a separating device in an automatic stamping machine (commercially known as cutter-creaser) for separating the cut paper sheet into the shaped section or sections and a waste section and smoothly removing the waste section remaining on a lower or female die of the separating device. A first embodiment of the separating device for separating the shaped sections from the waste portion of the paper stock is shown in Figures 1-3. A single panel 110 of a suitable material, namely wood veneer is firmly held in the stationary frame or mounting table 117 of the separation station 126 of the machine. By means of a laser beam, the panel is cut to form a plurality of openings 114a, b and c through it of the size and shape of the articles which have been cut in the sheet of paper stock before the sheet is delivered to the separation station 126. The portions of the panel which are severed from the panel in the cutting operation become the male stamps or upper dies 113a, b and c, respectively, which will be used to pass through the openings 114a, b and c, respectively, in the lower die from which they were removed for the purpose of

separating the shaped sections or articles from the waste portion of the paper stock. Thus, as will be see in Figures 1 and 2, the portions of the veneer panel 110 severed from the panel by the cutting process form the male separation dies 113a, b and c, leaving the remainder of the panel 110 as a female die plate having the openings 114a, b and c. The simultaneous creation of both the male and female die members is possible because cutting means such as a laser beam remove very little material, thus creating only a very narrow slit between the die portions. Also, this technique is capable of accurately cutting very intricate and complex shapes. It has the advantage of always producing a male die member which will pass through the opening in the female die with minimal clearance and without interference between the dies.

Abe teaches (column 8, lines 29-43) that

> [b]ecause the gap between the upper and lower dies is quite narrow and the bridges are small, there is only a slight tendency for the upper die to pull the waste portions into the area between the male and female dies. It has been found that breaking the edge to form a small chamfer 227 (FIG. 14) at the upper edge of the die opening is significant in preventing the die cut portions from inadvertently becoming caught against the edge of the die opening during transport of the die cut sheet into the separation station. This can happen if the die cut portion does not remain aligned with the remainder of the sheet of paper stock. This chamfer only needs to be provided at the downstream edge of the die opening as indicated by arrow F indicating the direction of movement of the paper stock (FIG. 14).

Abe does not disclose how chamfer 227 (shown in Figure 14) is formed at the downstream upper edge of the die openings 114a, b and c.

Dombrowski's invention relates generally to edge contouring tools, and more particularly, to a piloted deburring tool used in combination with an industrial manipulator for automatically deburring precision metal parts. Dombrowski teaches (column 5, lines 47-64) that the robotic edge contouring system described in the patent "produces an extremely accurate chamfer (±0.002 in.) about the perimeter of precision aircraft engine parts, however, the system can be used to debur or edge finish simple or complex parts for various end uses."

In the Background of the Invention (columns 1-2), Dombrowski teaches

> [b]urr formation is an unavoidable consequence of every conventional material removal process. Burrs are fragments of built-up edge left on a workpiece edge during metal cutting. Some ways in which burrs can be formed include plastic deformation of the workpiece, tearing of metal chips from the workpiece, and stock separation in advance of completion of the cutting operation.
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> . . .
>
> In the past, most deburring was performed manually due to the high degree of dexterity the procedure requires. Manual deburring has proved to be an expensive, labor intensive, monotonous, time consuming job which produces an inconsistent finished surface. More recently, deburring tools have been coupled with industrial robots in an attempt to improve product quality and increase production.
>
> Deburring is a micromachining process which is extremely difficult for a robot to perform due to the high degree of flexibility and dexterity required. Several automated edge contouring or deburring systems have been designed to debur precision machined parts. The simplest systems comprise a grinding tool secured to a robot arm, while more sophisticated systems may include computer controlled robot systems, force sensors and feedback control schemes.
>
> . . .

> Closed loop robotic deburring systems provide feedback control schemes and contain sensors for monitoring either the position of the robot's arm or cutting forces during deburring. The sensor signals are continuously compared with the preprogramed position or force instructions for the robot arm, and are used to generate an error signal which is fed back to the controller. The controller adjusts the positioning of the robot arm to reduce the magnitude of the error signal. An unfortunate drawback of a closed loop feedback control scheme is the inability of the robot to respond in real time to the detailed features of a burr. The action of the deburring system in response to the error signal will always suffer a time delay due to the electrical and mechanical response times of the system. The position of the deburring tool will oscillate about the desired position as a result of this delay.
>
> One simple solution to the problem of time delay associated with a closed loop feedback control scheme is the utilization of an open loop control system. In a simple open loop system, the desired tool path is programmed into the robot's controller and is independent of output measurements. A disadvantage of an open loop system is its inability to alter tool path in response to variations in part geometry or to part misalignment.

In the Objects of the Invention (column 2), Dombrowski then provides that an object of the present invention is "to provide a comparatively simple automated deburring system which utilizes a piloted deburring tool to precisely machine part edges."

Dombrowski illustrates in Figures 1 to 3 an edge contouring system for performing precision robotic deburring of workpiece edge. The edge contouring system includes an industrial manipulator 12, such as an ADEPT ONE robot manufactured by ADEPT Technology, Inc. The ADEPT ONE robot is a Selectively Compliant Arm for Robotic Assembly (SCARA) type robot. Secured to the end of the robot's arm 14 is a tool holder 10 and rotary cutting tool or deburring tool 30. The workpiece to be deburred (not shown) is secured to the top surface of a rotary index table 18 rotatable

mounted to a work table 16. An index table controller 22 operates a drive mechanism 20 to control the position of index table 18 and the workpiece secured thereto. Tool holder 10, rotary cutting tool 30 and robot arm 14 are positioned above work table 16 and index table 18.

Dombrowski's tool holder 10 is shown in greater detail in Figure 4. The tool holder includes a housing 42 consisting of a front plate 44, side plates 46 and 47, a back plate 48 opposite front plate 44, and a top plate 49. The upper portion of an air grinder 34 is secured within a yoke 40 within housing 42. The lower portion of grinder 34 extends below the housing and yoke. Deburring tool 30 is held in a chuck 32 attached to, and rotated by, grinder 34. Linear bearings 38 are positioned between yoke 40 and side plates 46 and 47 to permit translation of the yoke and grinder between the front and back plate of the housing. Arrow 41 shows the direction of travel in which yoke 40 and grinder 34 are constrained by housing 42 and bearings 38. Placed between yoke 40 and back plate 48 is a compliance device 36. The compliance device is a shock absorber device which functions to dampen motion of the grinder and yoke in the direction shown by arrow 41.

Dombrowski's deburring tool 30, also known as a rotary grinder or bur, is shown in side view in Figure 5. The deburring tool includes a shaft 52, a plurality of flutes or cutting teeth 54, and an integral guidance pilot 56. The deburring tool is symmetric

about an axis of rotation 57. Pilot 56 is actually a shaft coaxial with shaft 52 but of smaller diameter which extends below shaft 52 and flutes 54. Flutes 54 extend from the end of shaft 52 to the base of pilot 56 at an angle α relative to the normal of axis 57. Shaft 52 is secured in chuck 32 during operation of the edge contouring system.

Dombrowski's edge contouring system operates as follows with reference to Figure 6. The workpiece or part to be deburred is fixed to the top of index table 18. Industrial robot 12 is programmed[2] to move deburring tool 30 along the perimeter of part 58 such that the axis of compliance 41 is at a right angle to the part edge at all times. Compliance device 36, which is preloaded with a force of one pound, exerts pressure on the yoke and grinder to keep deburring tool 30 and pilot 56 in contact with part 58. Deburring or chamfering of the part edge is accomplished by rotating deburring tool 30 at high RPM in the direction of arrow 66 while the industrial robot moves the tool assembly along the part edge. Material is removed from the top edge to form a chamfer 60 by the action of the cutting teeth on the tungsten carbide deburring tool or abrasive on a ceramic tool. Movement of the tool assembly is in the direction of arrow 64 at the instant illustrated in Figure 6. Pilot 56 enables the deburring tool to maintain an extremely accurate chamfer by limiting the tool's horizontal penetration into the part edge. Vertical penetration is controlled by manipulator 12. The width of the chamfer is

[2] Claim 7 provides that the industrial manipulator "comprises a computer controlled robotic arm."

determined by the position of tool 30 along the Z axis. Positioning the deburring tool lower along the z axis would produce a wider chamfer, while raising the tool would cut a narrower chamfer along the part edge.

An initial question raised by the appellant in the brief (pages 11-13) and reply brief (pages 2-6) is whether or not Dombrowski is analogous art.

The test for non-analogous art is first whether the art is within the field of the inventor's endeavor and, if not, whether it is reasonably pertinent to the problem with which the inventor was involved. In re Wood, 599 F.2d 1032, 1036, 202 USPQ 171, 174 (CCPA 1979). A reference is reasonably pertinent if, even though it may be in a different field of endeavor, it logically would have commended itself to an inventor's attention in considering his problem because of the matter with which it deals. In re Clay, 966 F.2d 656, 659, 23 USPQ2d 1058, 1061 (Fed. Cir. 1992).

In the present instance, we are informed by the appellant's originally filed specification (page 3, lines 3-19) that

> In an effort to address the problem of the blank edges catching on the tool, the edges defined by the tools have been chamfered or otherwise relieved. Historically, the process of chamfering the edges of the female stripping boards and the female blanking tools, has been accomplished using a hand held router. This often results in more material than is necessary being removed on more edges than are necessary to prevent the advancing work material from catching. Accordingly, when the stripping and blanking operations are performed, the relieved edges on the tools causes the edges in the blank to become crushed or

> otherwise deformed. This manual operation is time consuming and largely dependent on the operator's skill.
>
> Based on the foregoing, it is the general object of the present invention to provide a method for preventing the advancing work material from catching on the stripping and blanking tools that overcomes the problems and drawbacks of prior art methods.
>
> It is a more specific object of the present invention to provide a method for relieving the edges defined by the stripping and blanking tools that results in minimum material removal on the tools, and deformation of the blank.

As noted above, Dombrowski teaches that automated deburring systems which utilize a deburring tool to machine part edges including a computer controlled robotic arm were developed to overcome problems associated with manual deburring. Thus, it is our view that Dombrowski falls into the latter category of the Wood test, and logically would have commended itself to an artisan's attention in considering the appellant's problem. Thus, we conclude that Dombrowski is analogous art.

Claim 1

We sustain the rejection of claim 1 under 35 U.S.C. § 103.

Claim 1 reads as follows:

> A method for selectively relieving sharp edges in a tool used in die cutting web or sheet-type work material, comprising the steps of:
> providing a machining apparatus for supporting said tool thereon, said machining apparatus including a rotary cutter mounted thereon and moveable relative to said tool;
> providing a controller having machine readable shape data corresponding to said tool stored therein;

operating said controller to determine, responsive to said stored shape data, locations of edge segments defined by said tool against which said work material will impinge as said work material is advanced onto said tool in a first direction;

causing said controller to generate a machining path, which when followed by said cutter will relieve said edge segments; and

operating said machining apparatus to cause said cutter to follow said machining path in response to command signals generated by said controller, thereby relieving said edge segments and preventing said work material from catching on said tool as it is advanced thereon.

Based on our analysis and review of Abe and claim 1, it is our opinion that the differences[3] are:

(1) providing a machining apparatus for supporting a tool (i.e., Abe's female die plate with openings 114a, b and c) thereon, the machining apparatus including a rotary cutter mounted thereon and moveable relative to the tool;

(2) providing a controller having machine readable shape data corresponding to the tool stored therein;

(3) operating the controller to determine, responsive to the stored shape data, locations of edge segments defined by the tool against which the work material will impinge as the work material is advanced onto the tool in a first direction;

(4) causing the controller to generate a machining path, which when followed by the cutter will relieve the edge segments; and

[3] After the scope and content of the prior art are determined, the differences between the prior art and the claims at issue are to be ascertained. Graham v. John Deere Co., 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966).

(5) operating the machining apparatus to cause the cutter to follow the machining path in response to command signals generated by the controller, thereby relieving the edge segments.

With regard to these differences, the examiner determined (answer, pages 3-4) that

> it would have been obvious to one having ordinary skill in the art at the time the invention was made to have utilized the programmable chamfering apparatus taught by Dombrowski et al. to chamfer the edges of the female tools that cause the paper stock to snag as taught by Abe et al. for the purpose of providing an automated chamfering device that precisely chamfers the tools (Dombrowski et al., column 1, lines 40-41).

Implicit in this rejection is the examiner's view that the above noted modification of Abe would result in a method which corresponds to the method recited in claim 1 in all respects.

The argument advanced by the appellant in the brief (pages 8-11, 13 and 14) and reply brief (pages 6-9) does not convince us that claim 1 is patentable over the combined teachings of the applied prior art for the reasons that follow as well as the reasons set forth by the examiner in the answer (pages 4-10).

First, the appellant has argued the deficiencies of each reference on an individual basis. However, it is well-established that nonobviousness cannot be

established by attacking the references individually when the rejection is predicated upon a combination of prior art disclosures.[4] The test for obviousness under 35 U.S.C. § 103 is what the combined teachings of the references would have suggested to one of ordinary skill in the art.[5]

Second, the appellant has argued limitations not found in claim 1. It is well-settled that limitations found only in the specification of a patent application should not be imported or read into a claim.[6] In that regard, it is our opinion that claim 1 does not require that **all** edge segments of the tool (e.g., a female die) against which the work material will impinge to be determined and relieved (e.g., chamfered).[7]

Third, Abe's teaching that the small chamfer 227 only needs to be provided at the downstream edge of the die opening does not constitute a "teaching away" from the claimed invention. As to the specific question of "teaching away," our reviewing court in In re Gurley, 27 F.3d 551, 553, 31 USPQ2d 1130, 1131 (Fed. Cir. 1994) stated:

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[4] See In re Merck & Co. Inc., 800 F.2d 1091, 1097, 231 USPQ 375, 380 (Fed. Cir. 1986).

[5] See In re Young, 927 F.2d 588, 591, 18 USPQ2d 1089, 1091 (Fed. Cir. 1991) and In re Keller, 642 F.2d 413, 425, 208 USPQ 871, 881 (CCPA 1981).

[6] See In re Donaldson, Co., Inc., 16 F.3d 1189, 1195, 29 USPQ2d 1845, 1850 (Fed. Cir. 1994), In re Priest, 582 F.2d 33, 37, 199 USPQ 11, 15 (CCPA 1978) and In re Prater, 415 F.2d 1393, 1405, 162 USPQ 541, 551 (1969).

[7] Claim 1 does require that some edge segments of the tool against which the work material will impinge to be determined and relieved.

> A reference may be said to teach away when a person of ordinary skill, upon [examining] the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.

While Abe does not teach that all edge segments of the tool against which the work material will impinge are relieved, there is nothing in Abe that warns a person of ordinary skill against relieving all edge segments of the tool against which the work material will impinge are relieved . In other words, there is nothing in Abe that teaches that relieving all edge segments of the tool against which the work material will impinge should not, or cannot, be utilized.

Lastly, we believe that the examiner did not employ impermissible hindsight in the rejection under appeal since there are ample teachings, suggestions and motivations in the applied prior art supporting the combination of Abe and Dombrowski as set forth in the rejection of claim 1. In this case, Abe's silence as to the manner of forming the chamfers would have provided sufficient suggestion and motivation for a person of ordinary skill in the art at the time the invention was made to have relied upon known methods of chamfering edges, such as manually using a hand-held router[8] and routers mounted to robot that are computer controlled as taught by Dombrowski. Since Dombrowski specifically teaches the benefits of a router that is mounted to robot that is computer controlled over a hand-held router (e.g., improved product quality, increased

[8] Admitted by the appellant as being prior art (specification, page 3, lines 3-12).

production, extremely accurate chamfer), it is our conclusion that it would have been obvious at the time the invention was made to a person of ordinary skill in the art to have formed the chamfers in Abe's female die plate according to the method and apparatus suggested and taught by Dombrowski's edge contouring system.

For the reasons set forth above, the decision of the examiner to reject claim 1 under 35 U.S.C. § 103 is affirmed.

Claims 5 and 6

The appellant has grouped claims 1, 5 and 6 as standing or falling together.[9] Thereby, in accordance with 37 CFR § 1.192(c)(7), claims 5 and 6 falls with claim 1. Thus, it follows that the decision of the examiner to reject claims 5 and 6 under 35 U.S.C. § 103 is also affirmed.

Claims 2 and 7

We will not sustain the rejection of claims 2 and 7 under 35 U.S.C. § 103.

Claims 2 and 7 both include the step of generating a machining path approximately equivalent to a shape defined by at least one aperture extending through the tool, shifted in the first direction by a predetermined distance. We agree with the

[9] See page 6 of the appellant's brief.

appellant's argument (brief, pages 14-16) that this limitation is not taught or suggested by the applied prior art. We do not agree with the examiner's opinion (answer, page 11) that to form the chamfer 227 taught by Abe with the edge contouring system of Dombrowski would inherently result in a tool path that will be approximately equivalent to the shape defined by Abe 's openings 114a, b and c. In that regard, we note that Abe's chamfer 227 could be formed with the edge contouring system of Dombrowski by a tool path that would approximate the downstream edge of Abe 's openings 114a, b and c but would not approximate the other edges of Abe 's openings 114a, b and c (e.g., the upstream edge, the edges between the upstream and downstream edges).

For the reasons set forth above, the decision of the examiner to reject claims 2 and 7 under 35 U.S.C. § 103 is reversed.

Claims 3 and 4

We will not sustain the rejection of claims 3 and 4 under 35 U.S.C. § 103.

Claims 3 and 4 both include the step of generating a machining path approximately equivalent to a shape defined by at least one outer edge section of the tool against which the work material will impinge as the work material is advanced onto the tool in the first direction, shifted in the first direction by a predetermined distance. We agree with the appellant's argument (brief, pages 16-18) that this limitation is not

taught or suggested by the applied prior art. In that regard, we note that Abe does not machine (i.e., chamfer) any outer edge section and that the teachings of Dombrowski would not have suggested, absent the use of impermissible hindsight, machining any outer edge section of Abe's tool (i.e., the female die plate 110).

For the reasons set forth above, the decision of the examiner to reject claims 3 and 4 under 35 U.S.C. § 103 is reversed.

CONCLUSION

To summarize, the decision of the examiner to reject claims 1, 5 and 6 under 35 U.S.C. § 103 is affirmed and the decision of the examiner to reject claims 2 to 4 and 7 under 35 U.S.C. § 103 is reversed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED-IN-PART

IRWIN CHARLES COHEN Administrative Patent Judge	)
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